MINISTRY OF HEALTH
SCOTTISH HOME AND HEALTH DEPARTMENT

Memorandum on the Control of Outbreaks of Smallpox

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FOREWORD

The outbreaks of smallpox during 1962 in England and Wales made it clear that many Medical Officers of Health would welcome general guidance from an authoritative source on the control of this disease. As a result a thorough review of current recommendations was made and a Memorandum prepared. This is now being issued jointly by the Ministry of Health and the Scottish Home and Health Department.

In preparing the Memorandum the Departments have drawn on the practical experience of a number of Medical Officers of Health and on the advice of various experts in different aspects of the subject. The assistance so freely given by those consulted is most gratefully acknowledged.

The Memorandum is intended as a companion to the Ministry of Health *Memorandum on Vaccination against Smallpox* (H.M.S.O. MEMO. 312/MED revised November 1962) and the *Joint Medical Memorandum on the Diagnosis of Smallpox* (Ministry of Health and Scottish Home and Health Department). The format is such that the three memoranda can be bound together.

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MEMORANDUM ON THE CONTROL OF OUTBREAKS OF SMALLPOX

1. It is more than twenty-five years since official guidance on the control of smallpox was offered to Medical Officers of Health in England and Wales in Memorandum 215/Med (1938). In Scotland it was not thought necessary at that time to offer formal guidance, but it has now been agreed that a revised and comprehensive document should be issued to all Medical Officers of Health in Great Britain. The present Memorandum replaces Memorandum 215/Med (1938).

2. The incidence of smallpox in Great Britain during recent years has been very low compared with that recorded during the early part of the century. In 1902, for example, there were nearly 15,000 cases of variola major including some 2,600 deaths. From 1922 to 1934 the less virulent variola minor was endemic; in 1927 there were more than 14,000 notified cases including 47 deaths.

3. Since 1935 smallpox has no longer been endemic in the United Kingdom, but occasional outbreaks have followed importations of the disease. Apart from the occurrence of variola minor in Lancashire in 1952 all these outbreaks have been of variola major.

Table: Smallpox in Great Britain, 1937–1962

Year	*Cases*	*Deaths*	*Year*	*Cases*	*Deaths*
1937	4	—	1950	28	7
1938	19	—	1951	27	10
1939	1	—	1952	135	1
1940	1	—	1953	30	8
1941	—	—	1954	—	—
1942	108	25	1955	—	—
1943	—	—	1956	—	—
1944	6	3	1957	4	2
1945	4	—	1958	6	1
1946	56	14	1959	1	—
1947	78	15	1960	1	—
1948	—	—	1961	2	—
1949	19	5	1962	68	26

4. Despite the most effective health control measures, which can be enforced at ports and airports, (see Appendix A) outbreaks of smallpox must be expected to occur from time to time. Experience has shown that such outbreaks can be controlled by prompt and vigorous local action.

Ascertainment and Diagnosis

5. The Medical Officer of Health of a County Borough, Municipal or Metropolitan Borough or County District, (in Scotland, of a County or Large Burgh), should ensure that all doctors in his district, both in general practice and in hospitals or other institutions. are aware that he should be notified immediately whenever a patient is either found or suspected to be suffering from smallpox.

6. Diagnosis must be as prompt as possible in order that appropriate preventive action can begin at the earliest moment. The Medical Officer of Health should as a matter of urgency visit the patient with the general practitioner or hospital doctor in charge of the case.

7. Under Section 38 of the Public Health Act, 1961, a Justice of the Peace may order a person to be medically examined if he is satisfied, on the written certificate of the Medical Officer of Health, that there is reason to believe this person is or has been suffering from a notifiable disease, that it is expedient so to examine him and that either his doctor is not treating him or, if he is, consents to the making of the order. In Scotland powers exist, under Section 45 of the Public Health (Scotland) Act, 1897, which enable a Medical Officer of Health, should he be refused access to such a person, to obtain a warrant from a sheriff, magistrate or Justice of the Peace.

8. If he has any doubt about the diagnosis the Medical Officer of Health can readily obtain a second opinion from one of the "Panel of practitioners designated to assist Medical Officers of Health in the diagnosis of smallpox". A list of such practitioners is given in the *Memorandum on the Diagnosis of Smallpox* issued by the Health Departments; amendments to the list are from time to time published in the *Monthly Bulletin of the Ministry of Health and the Public Health Laboratory Service*, or, in Scotland, issued to Medical Officers of Health by the Scottish Home and Health Department. No charge is made to the patient or to the local authority provided that the second opinion is requested by the Medical Officer of Health.

9. The Medical Officer of Health will need to consider what protective clothing should be worn when entering the house in which a suspected case of smallpox is lying and the disposal and disinfection of that clothing on departure. A complete kit of protective clothing might include cap, gown, mask, gloves, polythene overshoes and polythene bag.

Laboratory Investigation

10. Facilities for the laboratory diagnosis of smallpox are provided by the Public Health Laboratories at Colindale, Newcastle and Cardiff, by the Virus Laboratory, Ruchill Hospital, Glasgow and by the University Departments of Bacteriology at Liverpool and Edinburgh. The assistance of these laboratories is best invoked at once. Methods of collecting and despatching material are described, in the *Memorandum on the Diagnosis of Smallpox*. Specimens for laboratory investigation should be taken in all cases, including those in which the diagnosis of smallpox appears to be clinically definite. The specimens should be sent to the laboratory by the fastest possible means and direct communication by telephone with the Laboratory Director is advisable. The virologist may wish to collect his own specimens and, if so, he should not be discouraged. Medical Officers of Health should hold two standard kits for this purpose and take one with them whenever called upon to visit a suspected case. These kits can be purchased from R. B. Turner and Co. Ltd., Inocula House, Church Lane, London, N.2, and will be replaced by the laboratory as they are expended.

Chickenpox

11. This disease, particularly when it occurs in adults, is the most likely to cause confusion in the differential clinical diagnosis of smallpox. Laboratory investigation is always indicated if there is any suspicion of smallpox. A Local Authority, on the advice of its Medical Officer of Health, can make chickenpox temporarily notifiable in accordance with the procedure set out in Section 147 of

the Public Health Act, 1936*. In Scotland power to make chickenpox temporarily notifiable is provided by Section 2 of the Infectious Diseases (Notification) Act, 1889. Statutory notification of chickenpox is sometimes useful, but experience has shown that it is usually as effective to ask local doctors voluntarily to report all cases of chickenpox and any other skin eruptions which may give rise to doubt.

Disposal of the Patient

12. A decision on the disposal of the patient is needed immediately and delay until the results of laboratory tests are available is rarely admissible.

Not Smallpox

13. When the Medical Officer of Health decides, with or without a second opinion, that smallpox can be excluded with confidence on clinical grounds alone, the general practitioner or the hospital doctor in charge of the case remains responsible for the disposal of the patient.

Smallpox Not Excluded

14. When smallpox cannot be definitely excluded on clinical grounds the disposal of the patient will depend upon the circumstances of the case. It is the responsibility of the Medical Officer of Health to decide whether the patient should be admitted to a smallpox hospital or allowed to remain elsewhere until a firm diagnosis has been established. Admission to a smallpox hospital will usually prove to be the wiser course; but it may be desirable in some circumstances, during outbreaks, to isolate some of the doubtful cases in their own homes until the results of laboratory tests are known. Such a course is justifiable only when the other occupants of the house are protected by recent successful vaccination or re-vaccination and can be relied upon to observe the strictest house and garden quarantine. Admission of any case in which there is a strong suspicion of smallpox to ordinary infectious disease hospital accommodation exposes other patients to risks which cannot be justified. Even the very doubtful cases should be admitted to smallpox accommodation, or to a unit offering a comparable degree of isolation, if home isolation is not practicable. Whether the patient is admitted to a smallpox hospital or not the Medical Officer of Health will obviously need to keep in close touch with the doctor in charge of the case until a firm diagnosis has been established.

Clinically Smallpox

15. When the diagnosis of smallpox appears to be clinically definite the patient should be removed at once to a hospital designated by the Regional Hospital Board for the reception of smallpox. The Medical Officer of Health may secure such removal, if necessary, under Section 169 of the Public Health Act, 1936 (in Scotland, under Section 54 of the Public Health (Scotland) Act, 1897). The medical officer at the smallpox hospital will wish to inform the Medical Officer of Health as soon as the diagnosis of smallpox has been confirmed or refuted.

Removal of Patient to Hospital

16. Careful consideration ought to be given in advance to the arrangements for transport of smallpox patients to hospital. Since Local Health Authorities

*In the London County Council area similar provisions are to be found in the Public Health (London) Act 1936 which, under the London Government Act 1936, ceases to have effect on 1st April, 1965. After that date the Public Health Act 1936 provisions will also apply to that area.

in England and Wales prepared their ambulance schemes under Section 27 of the National Health Service Act, 1946, many Regional Hospital Boards have reorganised their hospital accommodation for smallpox patients and, generally speaking, the number of smallpox hospitals has been considerably reduced. In many instances this has increased the distance over which patients may have to be transported by ambulance. In Scotland ambulance service is provided by the Secretary of State under Section 16 of the National Health Service (Scotland) Act, 1947, and is administered for him by the St. Andrew's and Red Cross Ambulance Service. Ambulance transport arrangements are dealt with in Appendix B.

TERMINAL DISINFECTION

17. Infected premises together with the contents, including the patient's clothing and that of all persons known to have been in contact with him since the onset of his illness and prior to his transfer to a smallpox hospital, require disinfection. Special care should be taken to trace, collect and disinfect any of the patient's clothing or bed linen which has been sent out of the premises, e.g. to a laundry or dry cleaner. Suggested reliable techniques are indicated at Appendix D. Medical Officers of Health will be aware of the powers contained in Section 168 of the Public Health Act, 1936, Section 195 (4) of the Public Health (London) Act, 1936, and Section 47 (4) of the Public Health (Scotland) Act, 1897, as regards the removal of contacts and the provision of special accommodation for them whilst the premises are being disinfected. The disinfection of ambulances and crews is described in Appendix C. Disposal of the dead is dealt with in Appendix E.

CASES PRESENTING IN HOSPITAL

18. The special considerations arising when a case of smallpox is first diagnosed within the curtilage of a hospital are dealt with in Appendix J.

Action as Regards Contacts

19. For the purpose of describing preventive action on the occurrence of a case of smallpox or suspected smallpox, persons at risk of infection are classified below as (*a*) known or probable contacts (*b*) contacts of known or probable contacts (*c*) possible contacts (*d*) unknown contacts. There is good evidence for the view that persons incubating smallpox do not become infectious until the onset of their illness, but a contact even though himself well protected by vaccination can carry infection on his person or clothing from a patient with smallpox to a susceptible individual.

KNOWN OR PROBABLE CONTACTS

20. Second only to prompt isolation of the patient, the most important means of checking an outbreak of smallpox are the tracing, vaccination and surveillance of known or probable contacts. Careful inquiries should be made to secure a full and accurate list of all persons who, from the time the patient was taken ill, fell into any of the following categories:—

(a) members of the patient's household;

(b) persons who worked in close contact with the patient;

(c) any other persons who were in close contact with the patient;

(d) persons who entered the sick room before it was disinfected;

(e) persons who handled the patient's personal belongings, clothing or bedding. This group will clearly include public health staffs called upon to carry out terminal disinfection and laundry staffs who may have dealt with the patient's laundry;

(f) persons who have been in contact with the body of a person who has died of smallpox.

21. All such contacts must be offered vaccination or re-vaccination immediately they are identified irrespective of their age or of the usual specific contra-indications. Two insertions of lymph not less than 1 inch apart are necessary. The results should be read on the third day and vaccination repeated if no reaction is visible. The prospects of preventing by vaccination the development of smallpox in susceptible contacts rapidly diminish as the interval between exposure to infection and vaccination increases. It is therefore desirable that a Medical Officer should carry with him a supply of lymph and vaccination equipment when tracing contacts.

22. The possible consequences of having to ignore specific contra-indications to vaccination may be offset in certain cases by the use of anti-vaccinial gamma globulin given into the opposite arm at the same time as vaccination is performed. Anti-vaccinial gamma globulin given on or about the tenth day after exposure may also offer useful additional protection against smallpox to contacts who have never previously been vaccinated or who have not been vaccinated for many years (see also para. 23 and App. K). Supplies of anti-vaccinial gamma globulin are obtainable from the Public Health Laboratory Service Laboratories at Birmingham, Bristol, Cambridge, Cardiff, Colindale, Leeds, Liverpool, Manchester, Newcastle, Oxford and Sheffield and advice on dosage, etc., can be obtained from the Directors of the laboratories mentioned. In Scotland supplies of anti-vaccinial gamma globulin may be obtained from the nearest Blood Transfusion Centre; the Director of the Centre will be able to advise on dosage.

23. Medical Officers of Health may wish to consider the use of N-Methylisatin beta-thiosemicarbazone (Methisazone) in addition to vaccination as an added safeguard for known and probable contacts. Its prophylactic use and limitations are discussed in Appendix K.

24. All known and probable contacts, including medical and public health workers, should be kept under daily surveillance for a period of sixteen clear days after the *last* possible exposure to infection. From the eighth day after the *first* possible exposure surveillance should be carried out by a medical officer. The patient's temperature should be taken and the whole surface of the body examined systematically in a good light, the findings being recorded (see Appendix F for suggested form of record). Medical officers will be aware of powers given to them by Section 243 of the Public Health Act, 1936 or Section 97 of the Public Health (Scotland) Act, 1897 to examine contacts in common lodging houses.

25. Apart from action which it may be necessary to take under Section 168 of the Public Health Act, 1936, under Section 41(1) of the Public Health Act, 1961, or Section 58 of the Public Health (Scotland) Act, 1897, no undue restriction need be advised on the movement of vaccinated contacts under surveillance. There is good evidence that contacts are not infectious before the onset of illness but the advice to be given will depend on individual circumstances. Some may be more co-operative if they are allowed to continue at work; the place of work and the route covered should be known to the Medical Officer of Health.

Temporary isolation either in their homes or elsewhere, at about the time when the onset of symptoms is most likely, may be considered desirable and, in some circumstances, may be essential.

Contacts of Known or Probable Contacts

26. The intimate contacts of every person placed under surveillance should be identified as soon as possible and vaccinated immediately. The intention is to protect them before the onset of illness in the person under surveillance; they themselves need not be under surveillance at this stage, but inspection of vaccination should be carried out on the third day and vaccination repeated if necessary.

Possible Contacts

27. Persons likely to have been exposed to risk of infection have been considered above. There remain some who may possibly have been placed at risk. These are persons who, since the onset of the patient's illness:—

(a) visited premises occupied by the patient without actual contact with the patient, his sick-room or personal effects:

(b) entered his place of work, if he continued to work while ill, without coming into close contact with him.

When a sick patient has been circulating freely in a social group in which contact is close and complex, the Medical Officer of Health may decide that this category should be extended to embrace any group likely to include possible contacts. Persons classified as possible contacts should be offered vaccination irrespective of age if there is no specific contra-indication. Thereafter they are not placed under formal surveillance but should be advised in writing to call in their own doctor if they feel unwell within a specified period.

Unknown Contacts

28. When direct enquiry has failed to identify individually those who have been in contact with an infectious smallpox patient among a group specially congregating together and later dispersing (e.g. in trains, buses, football matches or theatres), in exceptional circumstances it may be thought necessary to issue a general warning by means of press announcements or broadcasting. Medical Officers of Health in England are asked to consult the Ministry of Health, in Wales, the Welsh Board of Health, or, in Scotland, the Scottish Home and Health Department if they wish to make announcements of this kind in the national press or through the broadcasting and television services.

Sickness Benefit

29. The Ministry of Pensions and National Insurance has made special arrangements to ensure that payments of sickness benefit where there is an entitlement can be made promptly in respect of persons suffering from smallpox or of contacts who have ceased work at the request of the Medical Officer of Health. Under these arrangements the Medical Officer of Health will issue medical certificates (in bulk if necessary) direct to the local office of the Ministry of Pensions and National Insurance. A member of the staff of the local authority or hospital authority will normally be authorised to act on behalf of the claimants, and will obtain all information required (e.g. particulars of dependants), receive payment of benefit and pay the amounts to the claimants or disburse the money on their behalf in accordance with their instructions. The Managers of all local offices of the Ministry of Pensions and National Insurance have been informed of the procedure to be followed and will put it into operation as soon as a request is received from the local Medical Officer of Health.

Source of Infection

30. An attempt should be made to ascertain this as soon as possible. Enquiry should be made regarding the places visited by the patient at the conjectured time of infection. The incubation period of smallpox is usually regarded as extending from seven to sixteen days, but commonly it is twelve days. The conjectured date of infection may be deemed to have been twelve days before onset of symptoms or fourteen days before the appearance of the rash; a period of two days on either side of the conjectured date of infection should be given special attention. Inquiry should especially be made as to whether the patient had been abroad or had been in contact with anyone coming from abroad at this relevant time. In this way previously unrecognised cases of smallpox may be discovered.

31. If an unrecognised local source of infection is suspected, all certified causes of death in the appropriate area during the preceding two months should be scrutinised. In its most severe forms smallpox may be fatal before the appearance of the focal eruption and death may have been certified as due to scarlet fever, leukaemia or other diseases which may present haemorrhagic manifestations. Deaths attributed to chickenpox as well as reputedly typical cases of chickenpox since recovered should also be reviewed.

Communication of Information

By Health Departments

32. It is the normal practice for the Chief Medical Officers of the Health Departments to inform all Medical Officers of Health by letter as soon as there is information that smallpox has been imported.

By the Doctor in Charge

33. Formal notification by the doctor in charge of the case is required under Section 144 of the Public Health Act, 1936, and in Scotland under Section 3 of the Infectious Diseases (Notification) Act, 1889. This should be made immediately.

By Medical Officer of Health

34. Regulation 15(7) of the Public Health Officers Regulations, 1959, and Regulation 12(6) of the Public Health Officers (Port Health Districts) Regulations, 1959, lay statutory duties on District and Port Health District Medical Officers of Health in England and Wales to report cases of smallpox.

35. The normal practice should be that on the occurrence of a case, either definite or suspected, in England the Ministry of Health, in Wales or Monmouthshire the Welsh Board of Health and, in Scotland the Scottish Home and Health Department, should be informed immediately by telephone. The message should be confirmed by telegram and followed as soon as possible by a written report on the lines indicated in Appendix G. In England and Wales, at the same time and in the same way, Medical Officers of Health of County Districts should inform the County Medical Officer of Health and Medical Officers of Health of Port Health Districts should inform the Medical Officer of Health of each County or County Borough within which the whole or any part of the Port Health District is comprised. Confirmation by telegram and written report should follow as above.

36. In England and Wales the formal notification should be included by the Medical Officer of Health in his return to the General Register Office for the week. In Scotland the return to the Registrar General is made by the Scottish Home and Health Department.

37. Without waiting for confirmation of diagnosis the Medical Officer of Health should ensure that details of the case and particulars of contacts residing or employed in districts other than his own are passed at once to the Medical Officers of Health of the districts concerned. A suitable form of notice is shown at Appendix H. These Medical Officers of Health should later be informed whether the diagnosis has been confirmed or refuted.

38. In any district where a case of smallpox has occurred all doctors should be made aware of this. Medical Officers of Health should inform all local general practitioners and hospital medical staffs as soon as possible, and should offer to visit any case of illness which a doctor considers might be smallpox.

RESULTS OF LABORATORY TESTS

39. Directors of virus diagnostic laboratories will normally communicate the results of laboratory tests direct to:

(a) the Medical Officer of Health of the district concerned

(b) the medical practitioner or smallpox hospital medical officer in charge of the patient;

(c) in England the Ministry of Health, in Wales the Welsh Board of Health or in Scotland the Scottish Home and Health Department.

PRESS

40. The question of information for the Press is dealt with below (see paragraphs 44-48).

Co-ordination of Action

41. The action necessary to control spread of infection from a case of smallpox and from the contacts of the case is the responsibility of the councils of the county boroughs and county districts concerned and their Medical Officers of Health. In Scotland this responsibility lies with the councils of counties and large burghs. This action will include the vaccination and surveillance of contacts and such public announcements as may be necessary to ensure that adequate preventive measures are taken. Incidents which appear to be well under control do not necessarily call for co-ordinated efforts between neighbouring districts but it may be desirable at an early stage of an outbreak to reach agreement with other authorities not directly involved, particularly as regards extension of vaccination and general public relations.

EXTENSION OF VACCINATION

42. When vaccination is contemplated for persons other than those identified as contacts, this will be the responsibility of individual general practitioners or of the local health authority under Section 26 arrangements. There are two main circumstances in which this extension may occur.

(a) *Community Vaccination*

Where the measures described in paragraphs 19-28 do not appear to be controlling the outbreak, and cases are appearing in the general population which cannot be reasonably linked to the main line of infection, or be otherwise explained, a Medical Officer of Health may consider that arrangements should be made to encourage the entire population within part of the whole of his district to be vaccinated on

the assumption that they have all been or may be possibly exposed to infection. This is a logical extension of group vaccination. In these circumstances the Medical Officer of Health of a county district should confer with the County Medical Officer of Health so that appropriate arrangements can be made for clinics to be opened.

(b) *General Vaccination of Persons not at Risk*

Quite a different situation arises when a demand for vaccination or re-vaccination comes from members of the public not at risk. Prompt isolation of cases together with vaccination and re-vaccination of all contacts and the subsequent surveillance of known or probable contacts will usually suffice to extinguish an outbreak of smallpox which has been detected at an early stage. In such circumstances the hasty vaccination and re-vaccination of a large proportion of the local population in an attempt to raise the general level of local immunity to smallpox is to be deprecated. General public demand for vaccination is not inevitable if public relations are good from the outset. If, however, despite good public relations this enhanced demand for vaccination occurs, each individual case must be considered by the practitioner concerned. If he deems the request to be justifiable he will, naturally, take into account the specific clinical contra-indications and the risks involved. If there are no specific clinical contra-indications, the practitioner may decide that circumstances justify him in acceding to a specific request from one of his patients.

Vaccine Supplies

43. These are discussed in Appendix I.

Press Relations

44. News of a suspected case of smallpox spreads fast. Enquiries are likely to come in from the Press at a very early stage and should be expected. As a general rule statements should be entirely factual confirming the number of suspected, confirmed and notified cases, preserving anonymity (although the Press will generally discover the names and addresses very quickly) and identifying them with the county districts in which the disease has occurred and not a wider geographical area.

45. Ordinarily, statements should be made by the Medical Officer of Health for the district as the responsible officer, and it will be to him that Press enquiries will be addressed or referred by the Health Departments.

46. Press representatives will find it useful to have announcements in the form of a written handout, which they can collect or which can be read to them over the telephone. This will also save the Medical Officer of Health's time and the answering of many individual telephone calls. In the case of a serious outbreak it may be convenient to arrange an agreed time (or agreed times) when such announcements will be issued (or the Medical Officer of Health will be available to meet the Press to outline progress and plans for containing the outbreak). When Press announcements are issued copies should be sent promptly by Telex of other fast means in England to the Epidemiological Section of the Ministry of Health, in Wales to the Welsh Board of Health, or, in Scotland to the Scottish Home and Health Department.

47. When circumstances call for the announcement of vaccination plans for the local population or specified sections of it, it is necessary before any statement is issued that county districts (in England and Wales only) should consult the local health authority; the appropriate central health department should be informed. When a number of districts are involved some arrangements will need to be made to co-ordinate the preparation and issue of announcements and information.

48. As a rule the Ministry of Health, the Welsh Board of Health or the Scottish Home and Health Department will not issue statements to the Press or broadcasting authorities unless the outbreak assumes a national or international aspect. The respective Press Offices will confine themselves to confirming, on the basis of information provided by Medical Officer of Health, the basic facts about the position (i.e. number of suspected and/or confirmed cases). Otherwise Press enquiries will be referred to the Medical Officer of Health concerned. The Press Offices will, however, always be ready to assist if an approach to Press, Radio and Television news services is indicated in order, for example, to allay anxiety, to clear up misunderstanding or to assist the tracing of contacts. In such cases a request should be made in England to the Epidemiological Section of the Ministry of Health, in Wales the Welsh Board of Health and in Scotland H.L.A. Branch, Scottish Home and Health Department.

Control at Ports and Airports

1. The International Sanitary Regulations lay down maximum measures which may be taken in health control at ports and airports and only a few of these are mandatory. Article 83, relating to smallpox, states that the health administration at the port of entry may require anybody to produce a valid certificate of vaccination. If that person has been in an infected local area within the previous 14 days and has not been protected the health administration can require vaccination or surveillance or, under certain conditions, isolation.

2. Under a Council of Europe agreement designed to minimise the restriction of movement there are no health controls for persons arriving in aircraft which began a flight in any of the Council of Europe Agreement countries.

3. From 1st August, 1963, a valid certificate of vaccination against smallpox is required from all persons arriving from smallpox infected local areas and from the endemic areas. If not in possession of a valid certificate, vaccination may be offered to them and, should they refuse, they may be placed under surveillance or in isolation for 14 days from the day of their departure from the last territory visited. In addition a 'yellow warning card' is given to each person arriving from these areas. This places the onus upon the individual to go to his doctor should he feel unwell and to show him the card.

4. The medical staff at airports pay particular attention to flights from areas where smallpox is epidemic. At times of special anxiety, as was experienced during the beginning of 1962 when a number of cases of smallpox occured amongst immigrants entering the United Kingdom from Pakistan, exceptional arrangements may have to be made. For instance, in the 1962 episode, for some 3 months persons who had been in Karachi during the past 14 days and all persons from that infected local area came under health control whether they arrived direct or via a Council of Europe Agreement country. They were medically examined for evidence of recent successful vaccination. If there was no such evidence they were regarded as suspects, offered vaccination and then isolated for 14 clear days.

5. When a ship or aircraft arrives in this country, there having been a case of smallpox or suspected smallpox on board, disembarking passengers are offered vaccination and are put under surveillance. The Port or Airport Medical Officer also informs the Ministry of Health or the Scottish Home and Health Department of the details of the case and the names and addresses of travellers who may have come in contact with the suspect and who have disembarked or who are proceeding immediately to other countries. These particulars are then passed to the health administrations in the countries to which the travellers are intending to proceed.

6. A complete list of those disembarked to surveillance is also maintained and it is helpful for Medical Officers of Health to report to the appropriate central health department when they have traced individual contacts and placed them under surveillance so that the completeness of this operation can be determined.

7. Should the assistance of the Press, Radio and Television Services be needed to trace contacts following the discovery of a case of smallpox *after* passengers from the aircraft or ship have disembarked and dispersed, the Press Offices of the Ministry of Health or the Scottish Home and Health Department will be ready to arrange this if a request is made through Epidemiological Section of Ministry of Health or H.L.A. Branch of the Scottish Home and Health Department.

Transport of Smallpox Patients by Ambulance

1. In England and Wales, local health authorities will have given consideration to the transport of smallpox patients in formulating their proposals under Section 27 of the National Health Service Act, 1946. The Scottish Ambulance Service have made provision for such a contingency.

2. In recent experience it has proved wise to earmark ambulances for this purpose and to ensure that a list of volunteer crews is kept up to date and volunteers concerned are fully protected by vaccination and revaccination at yearly intervals. It has also proved advantageous in some regions for one ambulance authority to undertake the transport of smallpox patients on behalf of a number of neighbouring authorities, thus reducing the number of vehicles and crew at risk from contamination. Where arrangements of this kind have been agreed it is important that all controls should be informed of these and that steps are taken to ensure that calls are transmitted to the appropriate ambulance station without delay.

3. The ambulance selected for this work should be fairly new and of a design that enables disinfection to be carried out easily. It should, if possible be a radio-controlled vehicle so that contact can be made in case of a breakdown or where new instructions are sought, and so that reports of times and cases can be taken down outside the infected area.

4. Special vigilance is required to ensure that ambulances earmarked for this purpose are maintained in roadworthy conditions. When the occasion arises they should be stripped to bare essentials to facilitate subsequent disinfection. When the need to transport smallpox patients is likely to continue, e.g. during a local outbreak, it may be desirable to arrange for maintenance at an appropriate station by a volunteer fitter on the spot.

5. The selected ambulance drivers should all have driven over the actual routes approaching the smallpox hospital, since the journey may well have to be made in darkness or under bad weather conditions.

6. From the point when the patient has been contacted to the point when ambulance and crews have been disinfected, no physical contact should be made with any public facility or member of the public. If a message has to be passed, as in the case of a breakdown, this should be sent by radio control if possible, or if this is not possible by shouting to passers by. Ambulance personnel will also need to be vigilant in keeping wellwishers away from the patient while he is being removed from his bed to the ambulance.

7. Crews should carry with them the absolute minimum of personal belongings, and must be provided with and wear suitable protective clothing, e.g. gumboots, skullcap and white overalls. The latter should be of close woven denim material, having no pockets, fastening at the back, and with good overlap to ensure that clothing worn underneath is inaccessible during duty; it should also fasten tightly at the neck and wrists, and the trousers should overhang the top of the gumboots.

8. After a call has been received the ambulance station officer should inform the staff of the receiving smallpox hospital as soon as possible of the time of departure of the ambulance, and of its expected time of arrival at the hospital. On arrival the patient should be unloaded at the reception point and carried to the ward, etc. by hospital staff if these are available.

9. If the journey is long, or for any other reason likely to take a considerable time, provision in the vehicle for food, drink and micturition for patients and crew may well be necessary.

10. There should be instructions making it clear where disinfection of the crew, the ambulance and its contents, is to be carried out—either at the smallpox hospital or on return to the station—and who is to be responsible for this. Techniques are suggested in Appendices C and D.

11. If the ambulance is to return to its station before disinfection, it must remain tightly closed with the ventilation systems cut off. The crew must not leave the vehicle until the station is reached. A suitable arrangement for recording details of journeys must be made so that there is no contamination of documents.

12. All staff at the ambulance station should be vaccinated and kept under surveillance.

13. As many as possible of the above points should be incorporated in standing orders.

Disinfection of Ambulances and Crews

1. The smallpox ambulances and their contents are normally disinfected by the crew actually manning them. The crew must not discard their protective clothing until disinfection of the vehicle has been completed.

2. All removable fittings inside the vehicle, including loose floor coverings if any, are removed jointly, sprayed with a disinfectant and wiped dry. Blankets used in the removal of the patient, and stretcher canvases, should be placed in a special bag marked "Smallpox" for conveyance to the disinfector.

3. The interior of the vehicle, including the driver's cabin, (particularly steering wheel, brake and gear levers and other controls, should be sprayed systematically, first the floor, then the roof, then the sides and ends, including the inside of the door. The handle on the outside of the door should also be sprayed. A suitable disinfectant solution is White Fluid, 1 in 40 (British Standard 2462: 1961). It is preferable to use a powerful sprayer so that the work can be done thoroughly without entering the ambulance, but with weaker sprayers or other cleansing methods it will be necessary to enter the ambulance to attain this end.

4. In the absence of a suitable spraying apparatus, the same procedure may be carried out but surfaces are wiped over with a sponge which has been well soaked in White Fluid, 1 in 40.

5. After either procedure, the doors and windows of the vehicle are left open to the air for at least five minutes.

6. After disinfecting the ambulance the crew should:

(a) disrobe with as little disturbance of the infected articles as possible;

(b) place the discarded clothing in a special bag marked "smallpox";

(c) disinfect and remove their gumboots;

(d) enter the cleansing room and wash their hands and face thoroughly; and

(e) put on their own boots or shoes and other clothing.

7. If necessary, the treated ambulance may now be dried out, using a chamois leather.

8. As many as possible of the above points should be incorporated in Standing Orders. These should be introduced by a reminder that all unnecessary fittings, first aid material, etc., should have been removed before the ambulance was sent to pick up the smallpox patient.

Disinfection of Premises and Contaminated Articles

1. For disinfection of articles or premises contaminated by smallpox virus, certain basic principles must be established:

(a) In the early stages of the disease smallpox is infectious because of virus in respiratory discharges. This free virus is inactivated by formaldehyde in the form either of a vapour or of a liquid spray. (Committee on Formaldehyde Disinfection (1958) J. Hyg., Camb., **56**, 488).

(b) In the later stages smallpox is infectious mainly because of virus dried on the skin and bedclothes and possibly that contained within smallpox crusts. Smallpox crusts can be sterilised by exposure to dry heat at 160 °C for 60 minutes or to steam under pressure at 121 °C for 15 minutes.

(c) Smallpox crusts are known to have been rendered innocuous at room temperatures by several chemical disinfectants but, for practical purposes, White Fluid, 1 in 40 [British Standard 2462: 1961] in 6 hours is recommended. This disinfectant is particularly favoured because it is provided to B.S.I. specification, is universally available and is not irritating to the skin as are some others.

2. Whatever methods are employed and at whatever stage of the illness, persons engaged must themselves be fully protected by vaccination. Planning may then proceed on the following lines.

Disinfection (Concurrent or Terminal) of Articles.

3. The order of preference is as follows:

(a) Whenever possible the contaminated article should be destroyed by burning.

(b) If this cannot be done disinfection by steam under pressure should be employed if practicable. [M.R.C. Working Party on Steam Disinfection].

(c) If (a) and (b) are both impracticable chemical disinfection must be relied upon. For example, objects may be swabbed with White Fluid, 1 in 40, the swabs disposed of by burning, and the articles then left in a room, which is itself to be disinfected, during the minimum contact period of 6 hours.

(d) Books and other valuables may be disinfected by exposure to formaldehyde vapour or, if available, to ethylene oxide, in a special chamber.

Disinfection of Premises

4. The procedure to be adopted will depend upon whether the patient has been removed from a sick room during the early stage of the disease, i.e. before the rash has become pustular, or later. In the first case it is reasonable to depend upon the use of formaldehyde alone. But if the patient has reached the later stages of the disease before being removed the additional procedure, outlined in paragraph 6 below, is recommended. In either case, the room should be subjected to formaldehyde treatment, such as is described in the following paragraphs.

5. *Vaporisation of formaldehyde.* The most practical method for formaldehyde fumigation is the vaporisation of formalin by boiling.

(a) *Electrical method*

A stainless steel vessel of about 1½ gallon capacity should be used, provided with an electric kettle element and a kick-out safety-plug, which must fit loosely to ensure automatic interruption of the current when the vessel boils dry. An additional precaution would be a time switch set to open just before evaporation is completed. This apparatus is suitable for rooms of about 3,000 cubic feet. For larger rooms a number of these units should be dispersed.

The mixture employed is 2 pints of water to 1 pint of commercial formalin for each 1,000 cubic feet of space. The use of larger quantities than these is undesirable.

The room should be well sealed and if possible the temperature maintained at above 18 °C (64 °F). The exposure time should be not less than 6 hours; and this is therefore best done overnight.

After fumigation the operator should enter the room wearing a service respirator or its equivalent and open all the windows. If insufficient ventilation is available to disperse the vapour quickly or the premises are required shortly a cloth may be suspended in the centre of the room for 2 hours impregnated with ¼ pint of ammonia solution for each 1,000 cubic feet of space.

(b) *Chemical method*

Where the electrical method cannot be applied the following is efficient. For each 1,000 cubic feet of space a ½ gallon jar is required containing 1 pint of commercial formalin. The jar should stand in a bucket or on a large tray. The room should be sealed and 6 ounces of permanganate of potash then dropped into each vessel. The operator should quickly withdraw and seal the door; within 10 seconds violent boiling begins. Extra water is not required because this is liberated during the chemical reaction. The exposure time is as for the electrical method and the subsequent recommended procedure should be carried out.

6. When formaldehyde fumigation has been completed the following additional measures are only necessary if the patient's rash had reached the pustular stage before his removal.

(a) Whenever possible the rooms should be cleaned by using a vacuum cleaner and the contents of the vacuum bag, preferably in a disposable liner, should be burned. The vacuum bag should be autoclaved.

(b) The vacuum cleaner should itself be thoroughly wiped with a cloth soaked in White Fluid, 1 in 40.

(c) If vacuum cleaning is not possible, all horizontal surfaces should be wet swept or swabbed with White Fluid 1 in 40 and the particulate matter thus collected should be burnt.

Disposal of Dead

RESPONSIBILITY

1. The local authority concerned normally assumes responsibility for the disposal of the bodies of persons who have died from smallpox, but in many instances undertakers are willing to make the necessary arrangements, acting under advice from the Medical Officer of Health. As soon as possible an explanation should be given to the relatives why special funeral arrangements are necessary and the advantages of cremation in these circumstances should be explained.

ENCOFFINING

2. Before removal from the deathbed the body should be enshrouded in a securely sewn blanket which is then soaked in White Fluid 1 in 40 and the body then removed to the hospital mortuary. The encoffining should be carried out by persons wearing protective clothing consisting of apron, gown, rubber overshoes, mask, headgear and rubber gloves. The body and the covering blanket soaked in White Fluid 1 in 40 should be placed in the coffin which contains sawdust or tow impregnated with White Fluid 1 in 40. The body should then be covered with more sawdust or tow which should then be further impregnated with White Fluid. The edges of the coffin should be puttied and the lid secured and sealed. Finally the coffin should be washed down on the outside with White Fluid 1 in 40. Thereafter the burial or cremation could proceed. Some authorities recommend that the body in its blanket should first be placed in a polythene bag before encoffining and the full procedure described earlier is not then necessary; others are content that a polythene bag alone is sufficient — but in either case an air valve must be provided.

CREMATION

3. It is possible to arrange for cremations to take place without the production of forms B and C to the Medical Referee. An order under Regulation 14 of the Cremation Regulations (S.R. and O., 1930, No. 1016) can be granted by the Secretary of State for Home Affairs to modify the regulations in a district whilst an epidemic of smallpox prevails. A similar order may be made by the Secretary of State for Scotland under Regulation 15 of the Cremation (Scotland) Regulations, 1935. Under this Order, which is valid for a specified period, a certificate from the Medical Officer of Health stating that the person died from smallpox is sufficient evidence. The Medical Officer of Health can be informed by telephone by the medical officer in charge of the case, and no documents need leave the hospital premises.

Contact Surveillance Card Contact No.....

All known or probable contacts (as defined in paragraph 20 of Memo) are to be placed under surveillance for 16 *clear* days from the last day of contact.

Name ..... Address .....

.....

Place of..... Route covered .....

work..... *Vaccinal History*

Contact of..... Primary .....

at..... Revacc. .....

Last on..... .....

Time and Place for Daily Surveillance.....

Officer Responsible for Surveillance.....

Date	Days Since 1st Contact	Days Since Last Contact	Vacc.*	Temp. am/pm	Symptoms	Eruption

**Vacc.* Put P=primary, R=revacc., Rep=repeat, S=success, N=not success.

From 8th day following first contact to 16th day following last contact inclusive, patient must be seen by a medical officer. Temperature will be taken and the patient stripped and examined thoroughly in a good light.

Report on Actual or Suspected Case of Smallpox

ADMINISTRATIVE DISTRICT OR SANITARY AREA
NAME OF MEDICAL OFFICER OF HEALTH
Patient's name, age, sex, address and occupation.
Has the patient recently arrived from overseas?
If so, date and port or airport of embarkation.
" " " " " " " " arrival.
Name of ship, or flight number of aircraft and name of airway.
Date of consultation
Date of onset of illness.
Date of appearance of rash.
Date of removal to hospital and name of hospital.
Vaccinal condition of patient.
Diagnosis.
Other relevant clinical information or remarks.

Suggested Forms of Notices regarding contacts

A. *Preliminary Notice*

To Medical Officer of Health CB/MB/UD/RD

This is to inform you that.....
residing at.....
may/is known to/is believed to/have been in contact with a confirmed/suspected case of smallpox (see below) in this area/on board S.S...../on Flight No.....

The said person is said to be staying at/shortly proceeding to
.....
which address is believed to be in your district. (If this is not so please forward to the appropriate M.O.H.).

I will write again on receiving further information on the diagnosis of the case in my area.

Particulars of Case

Initials	Date/Onset	Date/Rash	Date/Isolation

Movements during infective period.....
.....
.....

Date Medical Officer of Health

B. *Confirmatory/Amending Notice*

To Medical Officer of Health CB/MB/UD/RD

Regarding my notice of.....to inform you that
.....of.....
had been a contact of a confirmed/suspected case of smallpox and was proceeding to.....
believed to be in your area.

The diagnosis of the confirmed/suspected case is now regarded as smallpox/is **not** now regarded as smallpox.

Date (Signed)
Medical Officer of Health.

Lymph Supplies

A. England and Wales

1. Most of the smallpox vaccine used in the National Health Service is centrally purchased by the Ministry of Health and, in England and Wales, is distributed to the Public Health Laboratories and thence sent to clinics, general practitioners and hospitals on demand. All Public Health Laboratories will hold stocks, which can be replenished as necessary from the main reserves. A reserve of vaccine for national emergency is maintained separately.

2. Apart from taking part in local health authority schemes and drawing their vaccine from the laboratory for this purpose, general practitioners can prescribe the vaccine on E.C.10; this is then dispensed by pharmacists who usually obtain it from sources other than the main Ministry of Health supplier.

3. The ordinary supply to Public Health Laboratories runs at approximately 100,000 doses each month.

Recent experience during smallpox outbreaks

4. The bulked central reserve of vaccine was sufficient even at the height of the demand in 1962 but there was difficulty in getting all the supplies requested to laboratories in single does containers and in distributing supplies equitably in the face of excessive local demands.

5. It is suggested that Medical Officers of Health and the Laboratory Director could form an "ad hoc" Working Party to evolve a scheme for local distribution of supplies should the need arise, nominating one or more of their number to advise the Laboratory Director on distribution. The Medical Officer of Health of an area in which there is an outbreak should preferably not be called upon to give this advice, since he is otherwise preoccupied, but he should have a priority allocation of vaccine so that he can proceed to vaccinate contacts, and their contacts, without delay.

6. Once local schemes are formulated the Working Parties could go into recess until the threat actually arises; at that time consideration should be given to ensuring that the Press are properly informed as to the local position.

B. Scotland

7. Supplies of smallpox vaccine are held at three centres from which they may be had on demand. The centres are situated at Law Hospital (for the west of Scotland), Peel Hospital (for the south-east) and Bridge of Earn Hospital (for the rest of Scotland).

8. In case of need the issue of vaccine will be controlled by the Scottish Home and Health Department who will determine priorities.

Action in General Hospitals

1. The general principles of control enunciated in the memorandum are equally applicable when a case of smallpox is first diagnosed in a general hospital, but there are certain special considerations which might be over-looked. All Hospital Management Committees, Boards of Governors and Boards of Management should make plans for dealing with such a situation before it arises.

2. As soon as the diagnosis of smallpox is entertained it is essential to inform the local Medical Officer of Health and for him to be invited to see the case in hospital. He in turn is free to call upon the services of a member of the Panel of Smallpox Opinion. Meanwhile, all inessential movement from and into the vicinity of the affected ward or department should cease until a decision has been made.

3. If it is decided by the Medical Officer of Health that the patient must be dealt with as though suffering from smallpox, special regard must be paid to the best route from the department to the ambulance, to the protection of the attendants by vaccination and the use of protective clothing, and to the terminal disinfection of the stretcher trolley and any blankets not removed in the ambulance.

4. All persons who have entered the department or ward since the patient there was deemed to have been infectious should be regarded as known or probable contacts, immediately offered vaccination and placed under formal surveillance for 16 clear days. The vaccination of sick persons, particularly those receiving cortico-steroid therapy, carries an added risk of complications and consideration should be given to administering anti-vaccinial gamma globulin at the same time as vaccination is performed.

5. The responsibility for this vaccination and surveillance of persons within the hospital may conveniently be delegated to a senior member of the staff who may be designated the outbreak control officer. Alternatively it has proved valuable to second to the hospital an assistant medical officer of health particularly if he has recent experience of handling a smallpox outbreak and for him to assume the duties of an outbreak control officer. In either case, direct liaison between this officer and medical officer of health should be maintained.

6. Special accommodation should be provided in an appropriate part of the hospital for the temporary isolation of patients or staff who, whilst under surveillance, fall sick, They should remain here until their final disposal is determined. Plans must be laid for the safe acceptance of food and disposal of refuse of all kinds and of soiled linen from this isolation accommodation.

7. It will be necessary to identify all visitors to the affected ward during the period that the patient was thought to have been infectious. This information may be derived from visitors' books in the ward. The appropriate Medical Officer of Health must be told so that these individuals can be vaccinated and placed under formal surveillance.

8. If the patient was first diagnosed in a casualty or out-patient department, the building should be closed for terminal disinfection after the contacts have been identified and vaccinated. Thereafter, it may be re-opened and work may continue, (but see paragraph 12 below).

9. If the case is first diagnosed in a ward, it is advisable to place the ward patients and staff in quarantine whilst they remain under observation. The special needs of the patients and staff in the quarantined ward must be considered. The disposal of mail after disinfection, the need for entertainment, spiritual solace, and the surmounting of individual personal problems resulting from the prolonged isolation spring to mind as deserving careful thought.

10. The Hospital's Control of Infection Committee in consultation with the Medical Officer of Health will give consideration to the need to vaccinate some or all of the remaining patients or staff of the hospital in otherwise unaffected departments. The need to curtail visiting will depend on local circumstances but in general it should be limited to close relatives of the seriously or dangerously ill patients and to religious advisers, all of whom should be offered vaccination.

11. It has been the experience on a number of occasions that non-resident nurses who are not under surveillance have encountered difficulties when attempting to enter public vehicles on their way to and from work. This can be obviated by allowing them to wear ordinary clothing when outside the hospital grounds.

12. Beyond the domestic arrangements already discussed, the Hospital Management Committee or Board of Management in consultation with the Regional Hospital Board or the Board of Governors will need to determine with the Medical Officer of Health whether all or part of the hospital should be closed to new admissions until the period of surveillance is complete. It would seem reasonable, if the affected block or department can be adequately policed, for the rest of the hospital to be re-opened after all patients had been vaccinated and placed under surveillance. However if a common ventilation system is shared by the whole hospital it might be unwise to continue admissions during the surveillance period.

13. Every effort must be made to divert inquiry from the affected hospital so that the hospital lines are not blocked and normal business may proceed. The Medical Officer of Health should still be regarded as the source of information concerning smallpox in his area. But as the hospital service is likely to be approached direct, consideration should be given by the Hospital Management Committee, the Board of Governors or the Board of Management to the setting up of a special office to clear individual enquiries. The importance of news bulletins within the affected hospital must also be appreciated. The maintenance of morale will, to some extent, depend upon both staff and patients knowing how the situation is progressing.

Use of N-Methylisatin Beta-thiosemicarbazone (METHISAZONE)

1. Trials of this drug suggest that it confers a high but temporary degree of protection against smallpox. Its use should be considered, therefore, as a measure additional to, but not in substitution for, vaccination in the protection of known and probable contacts of a case of smallpox, where the risk is not a continuing one. It may be particularly useful when ascertainment of probable exposure is delayed until late in the incubation period, because at this time vaccination is less likely to be an effective protection.

2. Small stocks are held at Public Health Laboratories at Colindale and Manchester for this prophylactic use, and Medical Officers of Health may ask for the requisite quantities to be despatched to them direct from the appropriate laboratory. These stocks are not intended for therapeutic use. (The manufacturers may be prepared to issue the drug direct to clinicians for clinical trial in cases of the severe forms of generalised vaccinia.)

3. *As soon as known or probable contacts are ascertained they should immediately be vaccinated or re-vaccinated.* The drug can be administered at the same time as, or at any time *after*, vaccination — but not before, as this might interfere with the success of vaccination.

4. The drug is put up in capsules each containing 1·5 grams. The prophylactic dose for adults is 3 grams followed by 3 grams after an interval of 12 hours. Nausea is a common side-effect.

5. The protection thus afforded against smallpox may be expected to last for about a fortnight. If vaccination or re-vaccination has not been successfully performed and the individual is thought to be at further risk of contracting smallpox it is essential to attempt vaccination again at the end of this period. A second prophylactic dose of methisazone may also be given if this is thought necessary.

6. The drug need not be given either to known or to probable contacts who have been *successfully* vaccinated or re-vaccinated within the last 3 years.

7. When it is decided to use the drug to supplement vaccination, it is not necessary also to use anti-vaccinial gamma globulin. Because methisazone may possibly have an adverse effect on the human foetus, it is not advisable to give the drug to pregnant women — certainly not during the first 3 months of pregnancy. When pregnant women are known or probable contacts of a case of smallpox they should be vaccinated or re-vaccinated; and should also, at the same time, be given anti-vaccinial gamma globulin to diminish the possible risk of the foetus becoming infected by vaccinia.

8. Any of the drug remaining after use should be stored temporarily at room temperature under dry conditions until the opportunity arises to return it to the issuing laboratory.

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